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Attaining Visual Quality Objectives in Timber Harvest Areas—Landscape Architects' Evaluation

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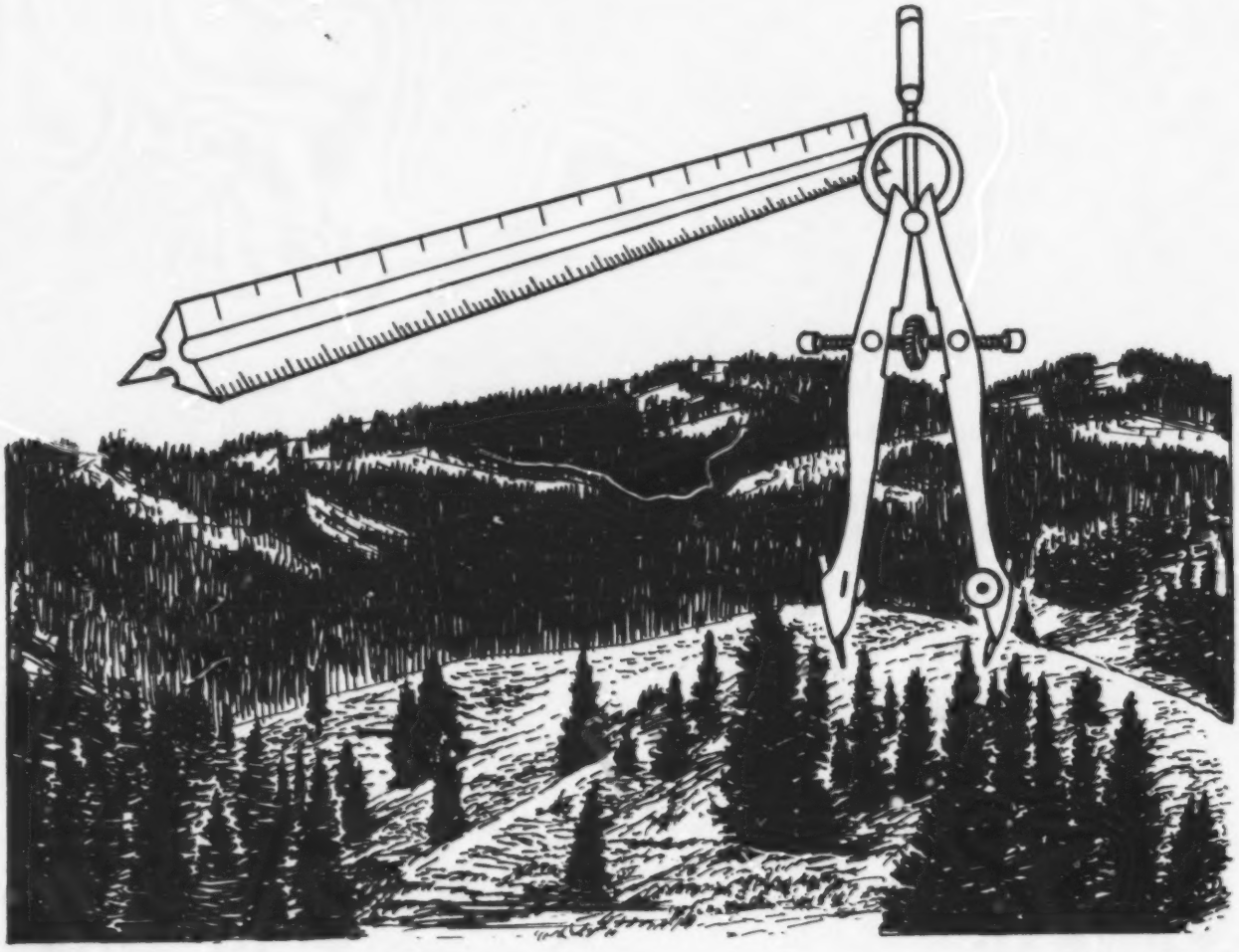

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THE AUTHORS

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RESEARCH SUMMARY

When management activities such as timber harvest are undertaken on National Forest lands, landscape architects establish plans and guidelines so the project will meet a desired level of visual quality. This visual quality objective (VQO) for a given project is based on forest conditions, topography, and the type of viewing that is anticipated (viewing distance, number and type of visitors, etc.). Although landscape architects provide criteria and guidelines to achieve these visual objectives, there is no direct feedback mechanism with which to monitor the public's reaction or ascertain the extent to which visual objectives are met.

In this study, 25 timber harvest areas (five in each of five VQO categories) in the Northern Rocky Mountains were selected by sampling timber sales and photographed with color slides. Landscape architects from three Forest Service Regions then evaluated these slides twice: (1) to judge the level of VQO they perceived to have been attained, and (2) to express their preferences for the areas on the like-dislike scale. Their ratings were mathematically transformed to adjust for variations among the slides used to represent each area, and differences among individual landscape architects in how they used the rating scale.

Results indicated that the VQO planned was usually, but not always, achieved. When individual areas were regrouped on the basis of the landscape architects' consensus of the VQO achieved, there was a close agreement among all three groups as to their perception of VQO category. The three groups were also in close agreement as to their preference ranking for different areas. There were sharp (and statistically significant) differences in the ratings given to two of the most visually evident categories—modification and maximum modification. The three other categories (preservation, retention, and partial retention) were all given higher preference ratings, but differences were not statistically significant among these three categories.

These results indicate that landscape architects can readily distinguish between areas that have varying degrees of visual impact from harvesting, and that less disturbed areas are preferred to those with heavier visual impact. In addition it indicates that some levels of management (retention and partial retention) can be undertaken so they are as visually pleasing as undisturbed (preservation) areas.

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INTRODUCTION

During the past two decades there has been a growing interest in the effects of forest land management activities on the visual quality of the landscape. The Forest and Rangeland Renewable Resources Planning Act of 1974 and the National Forest Management Act of 1976 direct that harvesting on National Forests will be done so as to protect all forest resources, including the visual resource.

The Forest Service has developed a Visual Management System that provides guidelines to mitigate visual effects of various management activities such as timber harvest, road building, or siting of facilities like powerlines and buildings. The objective of the system is to "... manage all National Forest System lands so as to obtain the highest possible visual quality commensurate with other appropriate uses, costs, and benefits" (Forest Service Manual 2380.2). Based on landscape characteristics and expected public use, visual quality objectives are developed and guidelines prescribed for accomplishing these objectives.

In planning the visual objectives for a project, the landscape architect in effect acts on behalf of the viewing public. If there is public concern for viewing, this concern is reflected and linked to the project by the landscape architect's plans and guidelines. It is assumed that the visual quality perceptions of the landscape architect correspond to those of the general public; and that, furthermore, the visual objective desired will be accomplished on the ground.

A considerable amount of research (over 200 studies) has been devoted to measuring scenic beauty (Arthur and Boster 1976; USDA 1983). Several studies have rated esthetic qualities of forest landscapes and tested public preferences. The Scenic Beauty Estimation (SBE) technique (Daniel and Boster 1976) was developed and extensively tested on timber harvest areas in the Southwest, and was later used in the Northern Rocky Mountain area to compare viewer perceptions of different harvest and logging methods (Benson and Ullrich 1981). These studies dealt primarily with areas subjected to different logging practices, as seen in the near view (one-fourth mile distance or less). None of these studies, however, were designed to evaluate viewer preferences for areas planned to meet specific visual quality objectives.

The purpose of this study was to evaluate the attainment of visual quality objectives (VQO) and the scenic beauty ratings for a timber harvest area. This process involved several phases: identify timber harvest sites and the visual quality objective planned, determine if this objective was actually accomplished, and measure landscape architects' preferences for these areas. The extent to which landscape architects actually reflect the public's notions is reported in a separate study of the public viewer group preference ratings for the same areas (McCool and others in press).

The harvest areas included are on National Forest lands in the Northern Rocky Mountains of western Montana and northern Idaho, where timber harvest and accompanying access roads are a common management activity that affects the visual resource. The study areas represent the most common type of harvested land—mature conifer timber growing on moderate to steep terrain at middle elevations (approximately 4,000 to 7,000 ft).

Three groups of Forest Service landscape architects (LA's) were included in the evaluations—Region 1 (Northern Region), Region 4 (Intermountain Region), and Region 5 (Pacific Southwest Region). This provided an opportunity to examine if LA's from areas with different vegetation and topographic features would give similar evaluations. Five VQO's were included: Preservation, Retention, Partial Retention, Modification, and Maximum Modification (these are defined and discussed in more detail under Study Methods). The specific objectives of the study were to determine:

1. If the VQO's planned for harvest areas were achieved, based on landscape architects' judgments of color slides of the areas, and if these judgments were different among Regions.
2. Preferences of landscape architects (on a like-dislike basis) for harvest areas in different VQO's, and if these preferences differed among Regions.

STUDY METHODS

The study in general used the Scenic Beauty Estimation (SBE) method; color slides were taken of harvest areas in different VQO categories. Landscape architects rated the slides on a 9–0 (like-dislike) scale from which the SBE rating was derived. In addition, the landscape

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architects were asked to classify each slide as to which VQO it represented; that is, was accomplished. The five VQO categories used were selected from USDA Handbook 462 (1974):

Preservation (P) =	Only ecological changes permitted
Retention (R) =	Management activities not visually evident
Partial Retention (PR) =	Management activities remain visually subordinate
Modification (M) =	Management activities may dominate, but must borrow from natural landscape forms
Maximum Modification (MM) =	Activities may dominate and may be out of scale in middle or foreground, but appear natural when seen as background.

A

B

Figure 1.—Typical scenes from harvested areas: (a) Retention, (b) Partial Retention, (c) Modification, (d) Maximum Modification.

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These categories are the principal ones related to most timber-growing areas and in the order listed represent increasing evidence of management activity. Normally, preservation is not a VQO used in timber-growing areas, but in this study scenes of uncut forest land were included so as to provide a baseline against which harvested areas could be compared. Typical scenes from sample areas are shown in figure 1.

C

D

Figure 1.—(Con.)

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A total of 25 sample areas were randomly sampled (five from each VQO as designated in the sale plan) from Northern Region Forest Service timber sales completed during the period approximately 1975–80. Most of the timber sales in the Region prepared during this time had landscape architect input. The 25 areas were distributed among western Montana and northern Idaho National Forests approximately in proportion to timber sale volume during the period. Sample areas were drawn from timber sale folders on file at the Forest Supervisors' offices. Several alternate sample sales were also included to cover such contingencies as poor photo conditions or ground conditions that did not correspond to site folder descriptions (such as major changes in sale layout, work not completed, etc.). Color slide photos were taken during the summer of 1982.

A final selection was made of the color slides to be used in the study. Photos of poorer quality were eliminated, and a random sample of five photos of the remainder was selected from each area. The slides were arranged in random order in the slide tray. The entire slide set then consisted of 125 slides (five VQO's × five areas in each VQO × five slides of each area). Five slides were determined to be an adequate representation of each area based on SBE procedures and testing of data from previous studies.

National Forest landscape architects from the three Regions first rated the slides on the 9–0 rating scale, and later classified the same slides as to the VQO they judged was represented. The second viewing was conducted after a break of several hours. Separate rating sessions for each group were held in conjunction with regional meetings of the LA groups in San Francisco, CA; Salt Lake City, UT; and Kalispell, MT. The same slide set was used for each group. The LA's were told only that the slides were of scenes in typical timber-growing forest areas, as viewed from roadside at middle ground viewing distance (0.5 to 3 miles). Location of the areas was not revealed.

The raw preference ratings (on a 9 = "like," 0 = "dislike" scale) were transformed into an SBE value as described by Daniel and Boster (1976). The "by slide" version of the procedure was used; this combines and standardizes preference ratings for each slide across viewers within the group. From these slide ratings an SBE score is derived for each area, using one of the uncut areas as a baseline (that is, its SBE score is set at zero and the SBE's for other areas are relative to this baseline). This results in an interval-like scale that permits various statistical analyses (Hull and others 1984). The VQO that was judged to be represented by each area was measured by the frequencies of ratings (P, R, PR, etc.) given to each slide. These were then combined and converted to percentages so comparisons could be made to determine how well areas met the intended VQO. These comparisons are described in detail in the analysis section.

ANALYSIS AND RESULTS

Attainment of Visual Quality Objectives

One purpose of this study was to compare the visual quality objective planned for the area with the landscape architects' judgment of the visual quality objective attained, as depicted by the slides. If there was perfect agreement, then 100 percent of the judgments would match the planned VQO. The actual ratings are shown in figure 2. In general, the mode of the judgments corresponds to the planned VQO, but there were variations. The most obvious difference was in the uncut areas. These were often judged as R, Retention. Comments by the LA's after sessions indicate this was a matter of interpreting category standards or definitions. Preservation is defined as permitting ecological change only, and because the entire set of slides was described as being in the general timber-growing zone, some LA's felt the P category was not appropriate and assigned R rating. Many scenes were judged to meet the planned VQO, but some scenes were judged to meet either a higher or lower VQO than what was planned. Higher ratings could reflect that actual operations on the ground were more successful in reducing impacts than was anticipated, or that natural revegetation had enhanced the scene. Lower ratings could indicate a shortcoming in planning or carrying out the harvest, or a subsequent unanticipated failure such as soil movement, revegetation failure, blowdown, insects, etc. The landscape architects were asked only to rate the slides, however; and the reasons for their ratings were not examined in this study.

Figure 2 shows percentage of ratings summarized for all five areas in each planned VQO category. In addition, the percentage ratings for each individual area were used

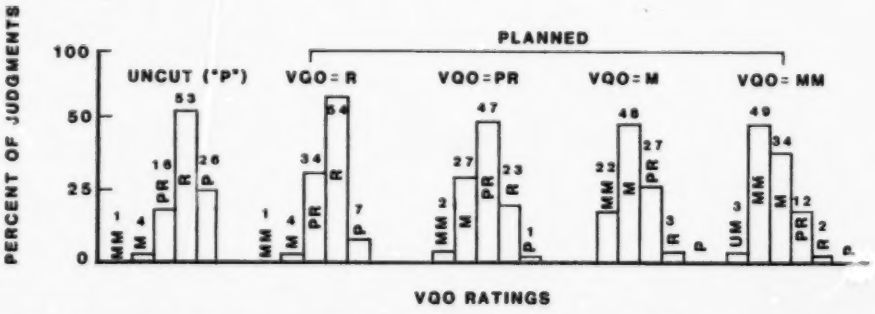

Figure 2.—Comparison of planned VQO with VQO judged to be attained.

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to determine a "consensus" rating for each area. Both the median and mode of percentage ratings were considered (they were virtually identical) and the modal rating for each LA group was compared (they were nearly identical among all three groups). Each area was then classified into the VQO category achieved, based on the consensus rating. Results were as follows:

Planned VQO	Number of areas	Changes in "consensus" classification	Number of areas in "consensus" class
Uncut (P)	5	One area classed PR	4
R	5	One area classed PR	5
PR	5	One area classed R	6
M	5	No changes	6
MM	5	One area classed M	4
Total	25		25

This shows that of the 25 areas, two were classed lower than the planned VQO (one uncut and one R went to PR) and two were rated higher (one PR went to R, and one MM to M). As noted earlier, both uncut and R areas were generally classed as R (fig. 2). However, although percentage R ratings were about equal, there were distinct differences in other ratings as follows:

four uncut areas: P = 33%; R = 54%; other = 13%

five R rated areas: P = 7%; R = 59%; other = 34%

We used these differences as a basis for assigning the areas into the consensus groups of four uncut P and five R areas.

Results suggest high but not perfect matching of planned vs. attained VQO goals in the study areas. Of the 25 areas, the LA's concluded that two did not meet the intended VQO, and two exceeded the planned VQO.

Scenic Beauty Estimates

The scenic beauty estimates of landscape architects were measured on a 9–0, like-dislike scale and transformed into SBE scores. The SBE scores were summarized in two ways: with areas grouped by "planned" VQO and areas grouped by "consensus" as described above. The SBE scores for each area were then used in a threeway analysis of variance test for differences between Regions, VQO's, and type of grouping. As shown in table 1, the type of grouping (planned vs. consensus) did not affect the SBE scores, but both Region and VQO category were highly significant. None of the interactions were statistically significant, but the F-value for VQO × Region (1.356) indicates a level of interaction that may be of some practical interest (Snedecor and Cochran 1967). The actual SBE scores based on the "planned" VQO groupings are shown in table 2.

Because SBE scores measure preferences in relation to a base reference area (in this case, one of the uncut

Table 1.—Three-way ANOVA Scenic Beauty Estimation (SBE) ratings

Source	df	MS	F	Significance
Type[1]	1	140.719	0.172	0.679
VQO	4	82,555.020	100.977	.000
Region	2	11,722.107	14.338	.000
Type × VQO	4	462.223	.565	.688
Type × Region	2	.738	.001	.999
VQO × Region	8	1,108.322	1.356	.223
Type × VQO × Region	8	22.326	.027	1.0
Error	120	817.563	—	—
Total	149	—	—	—

[1]"Type" is consensus vs. planned.

Table 2.—Scenic Beauty Estimate (SBE) scores by planned visual quality objective (VQO) and landscape architect Region[1]

Region	Uncut	Retention	Partial retention	Modification	Maximum modification	Mean
4	42.8	41.6	20.0	-30.0	-86.6	-2.4
1	18.2	2.0	.4	-34.2	-87.6	-20.2
5	20.8	5.2	-10.2	-52.6	-127.8	-32.9
Mean	27.3	16.3	3.4	-38.9	-100.7	

[1]Solid line connects mean scores that are not significantly different, for all groups combined. Dashed line connects mean scores that are not significantly different within each LA group analyzed separately.

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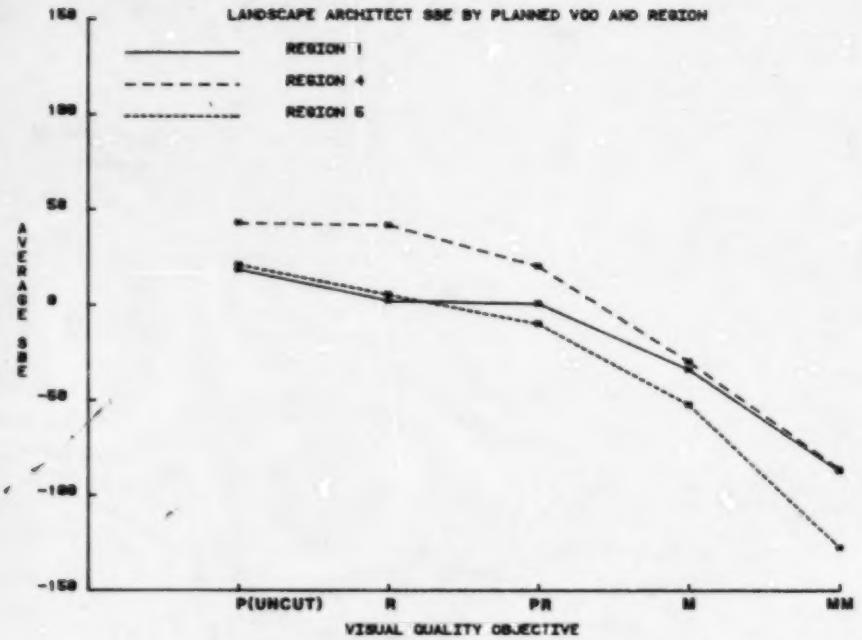

Figure 3.—Average SBE score by planned VQO category and landscape architect region.

areas), some of the scores in table 2 are positive, indicating they are preferred over the base area, and others are negative, suggesting they are viewed as less scenically attractive than the base area. The data in table 2 show that the overall order of mean SBE's is from highest in the uncut (P) areas to lowest in the Maximum Modification areas, which is the intuitive hypothesis. Not all of these scores are significantly different. Using the Newman-Keuls procedure to test for differences among all possible pairs of VQO means, the results are shown in the bottom line (mean-combined) of table 2. Maximum modification is significantly different from all other VQO's, but there is overlap among some other VQO's.

The SBE scores by Region are plotted in figure 3. The scores indicate that Region 4 and Region 5 LA's rate different VQO's similarly, but R−4 LA's consistently rate all VQO's higher than R−5 LA's do. Region 1 LA's, however, rated uncut and R VQO's about the same as R−5 LA's, but M and MM about the same as R−4 LA's. This pattern of scores among different Regions suggests the practicality of comparing SBE scores Region-by-Region (even though the F-value for the VQO × Region interaction was not statistically significant). For purposes of examining the differences between Regions, the Newman-Keuls procedure was used again to test differences between scores for each Region taken separately. The results are shown in table 2 with dashed underlining. Every Region significantly distinguished MM from all other VQO's, but the pattern of overlap among other VQO's was somewhat different among Regions.

CONCLUSIONS

Color slides from a sample of 25 timber harvest areas representing five planned VQO's in Northern Rocky Mountain National Forests were rated by Forest Service landscape architects from three Regions, on two scales—(1) the visual quality objective they judged had been attained, and (2) their scenic beauty on a like-dislike scale. Ratings indicated there were differences between the VQO planned and what was actually attained, but the consensus was that most areas met the planned VQO. (These judgments were essentially identical among all three LA groups.) In their SBE score preference ratings, however, sharp distinctions were made only for the VQO with the most evidence of activity (Modification and Maximum Modification). Among the other VQO categories, the SBE ratings were similar. The general relationship between VQO's was as expected, with higher SBE scores associated with VQO's having less evidence of activity, but statistically some scores overlapped; that is, they were not all significantly different.

The results support the idea of a system of visual quality objectives based on the degree of acceptable landscape modificatic The landscape architects did express a decreasing order of preference from Preservation to Maximum Modification. The fact that there were not statistically significant differences in the scores among all VQO's may be due in part to inherent scenic variability even within a given VQO. This could account for an overlap in ratings. Also, even though differences in VQO categories were recognized, areas may have been

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considered as being similar in scenic beauty preference because the job had been done well and the VQO met. Further evaluations may help in addressing this question.

These results indicate that although there was some variation in achieving VQO and in preferences for VQO's, the visual management criteria and guidelines can reduce the visual impact of harvesting, particularly in the more restrictive VQO categories. This supports the rationale behind ordered VQO categories. How do these categories relate to preferences of the general viewing public? Can the public discriminate among the VQO's in order of scenic preference? The answers to these questions also have important implications for the visual management system and should be addressed in further research.

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Benson, Robert E.; McCool, Stephen F.; Schlieter, Joyce A. Attaining visual quality objectives in timber harvest areas—landscape architects' evaluation. Research Paper INT-348. Ogden, UT: Intermountain Research Station; 1985. 7 p.

Three groups of Forest Service landscape architects rated color slides of 25 timber-harvested areas for attainment of visual quality objectives and for scenic beauty. Consensus was that objectives were usually attained; beauty ratings generally dropped and distinctions became more pronounced with increasing evidence of disturbance.

KEYWORDS: esthetics, landscapes, timber harvesting, visual management

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